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# The Study of the Relationship between House Price and Price Tolerance in China from the Perspective of Systems Engineering

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## Abstract

The real estate industry is a complex system. House price is the most important elements. House prices and the living standard of the residents are closely related. The state has adopted many policies to control high house prices. However, the effect of regulation is little, and the house prices rise even faster. This paper uses the theory and method of system engineering to study the Relationship between house price volatility risk and price tolerance of the residents in China. Based on the performance of the price fluctuations and trend analysis in our country by using a combination of quantitative and qualitative methods, the paper mainly explores the reasons of housing price fluctuations, hazard of price fluctuations and controlling challenges. Finally, this paper gives us some policy proposals to control housing prices in the future.

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House prices and the lives of residents are very closely concerned for each other, and the formation of the house prices is a rational choice made by government, real estates, banks, consumers including investors and experts that are influenced by the environment. Since housing system was innovated in our country in 1998, strong demand for housing has been continuing to increase in some countries. In recent years, the price of commercial residency generally rose faster and the price even jumped abnormally in some countries, which has greatly affected the no mal order of residents' living. State Department has taken many measures to prevent the real estate prices from soaring, and they even passed on these measures as political tasks to local government. Even so, the effect of regulation is not significant, and the housing prices rise faster instead. Here are the possible reasons:

## 1、Performance of the price fluctuations and trend analysis in our country

From the year 2000 to 2010, there has been a big rise in housing price in our country, and the soaring rise has been continuing since then. Although housing prices have been readjusted with many kinds of macro-control methods such as government tight-money policy, entire housing price is still rising and appears elusive.

(1) Housing prices rise by a large margin and a higher speed in our country.  
Since 2000, dates of housing price are as bellow:

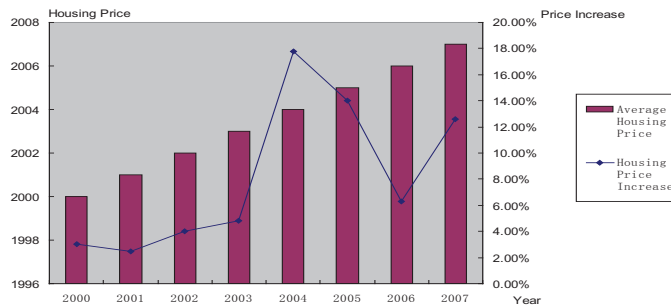


Fig.1-1 Housing price level and increase from 2000 to 2007

According to the statistic diagram, housing prices continue to rise from 2000 to 2007. The increase of average selling price of housing is 4.8%、17.8%、14%、6.3% and 12.6% from 2003 to 2007, so housing prices have a higher fluctuating range. Especially in the year of 2004, 2005 and 2007, housing prices rose by more than two digits. On the whole, the fluctuation of housing prices in recent years performs as bellow:

Firstly, the increase of housing prices and GDP is disagreeable.

When housing prices rise far higher than GDP and are obviously more than intrinsic value it deserved, it means housing prices are not harmonious with the level of economic development. There is a price bubble in real estate and real estate cause overheating status.

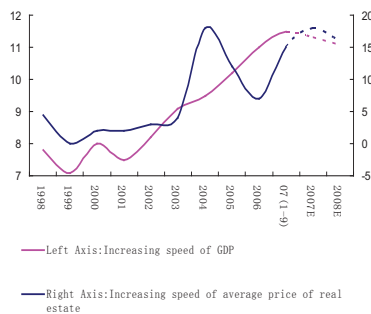


Fig.1-2 Increasing speed of GDP and average price of real estate

Secondly, the income of housing prices is not coordinated with development.

When we measure the level of housing consumption of one country, many countries use the price earnings ratio in the world, which is a composite indicator. “

rice earnings ratio” means ratio of secondary market price of freedom of dwelling unit to the income of median family. Most domestic scholars define the concept of “price earnings ratio” as ratio of income to the level of housing prices. The World Bank thinks that price earnings ratio is more appropriate between 3-6 times. If it is less than 3 times, there will be a shortage of housing situation, and more than 6 means beyond the affordability of urban residents. This standard has become an important frame of reference to both housing price and annual household income.

(2) There are large differences in housing price fluctuations in different cities of our country

To analyze the level and volatility of housing prices of different cities, we choose hot cities of Beijing, Shanghai, Guangzhou and Shenzhen as representatives and big or medium-sized city of Taiyuan, Nanjing, Wuhan as samples to compare with. According to price index figures obtained from the data collection of statistical yearbook:

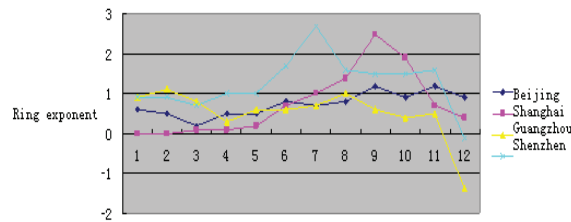


Fig.1-3 the monthly price index figure in 2007

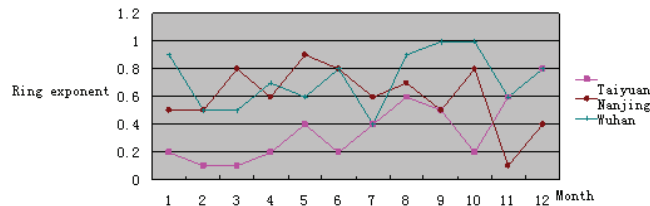


Fig.1-4 the monthly price index figure in 2007

We can obviously see, housing price index of hot cities is apparently higher than big or medium-sized cities, and housing price index of hot cities is the highest at 1%, while in the big or medium-sized city is 3%, and its average level is higher than 1%.

This is because hot cities have a higher degree of openness and introduce more foreign capital. Also they have a relatively rapid economic development and a greater demand for housing. On the contrary, big or medium-sized cities have far less housing demand than developed areas, because they are deep island areas and have a lower degree of openness, and their economy develops slower. Price volatility and price level of hot cities is obviously higher than big or medium-sized cities and general cities.

## 2、The analysis of housing price fluctuations in our country

From the economic point of view, based on the law of value, housing prices should base on its real value and fluctuates around by value supply and demand, while housing prices have been rising rapidly in recent years. The reason is that main factors affecting price fluctuations are social factors, economical factors, systematic, political factors, regional factors and so on. Now we focus on the land system and politics, increase of national economy, rising of incoming and saving, rate of exchange rate and interest rate, aspects of urbanization to analyze definitely.

### (1) Effects of housing prices on GDP

When the level of economic development of one country or region reaches a certain height, people's demand for real estate will be growing every day, and housing prices will rise if the demand for real estate is greater than the supply of price. In recent years, the economy has developed faster in our country, GDP keeps increasing at double digit, and economic growth is mainly characterized by the increasing of resident's income. But the income level of resident and the housing prices have close relations. With the rise of disposable income level and consumption structure of one country, real estate has been promoted as general public's major consumer goods. Consumption expenditure will surely include houses on the basis of meeting basic needs. It is this interaction between strong demand revenue expenditure, lower national Land availability and lacking of the supply of residential property that cause national housing prices to continue rising.

### (2) Effects of population growth and acceleration of urbanization on housing prices

Land prices of densely populated cities are generally higher; Population growth will make the demand for land rise and price of land goes up; Improvement of quality of population has a good role in promoting social

stability economic development and so on, then all of these make land prices go up. In return, the increasing of land prices lead to high housing prices. In recent years, China's urban population grow fast and large population flock into town, which leads to a shortage of housing, making housing prices going up.

### (3) Effects of land policy on housing prices

The development of real estate project must rely on land, and the reduction in land supply directly limits the number of supply of real estate goods. What's more, from the cost of supply point of view, soaring of housing prices has become an important factor of making housing prices higher.

The composition of the housing equation can be expressed as housing price=land acquisition cost +development cost +management fees +Investment interest +sales tax +development profits. For land is non-renewable resources, its natural supply is perfectly inelastic and economical supply is also very small. With the increase of population, demand for lands of the improvement of social and economy is increasing. From the economic point of view, supply and demand jointly determine price, and price of lands will naturally go up with the increasing demand for land and the shortage of supply of lands. In recent years, with the change of way in previously agreement of selling land, land prices increasingly reflect the market's supply and demand. Mixed with speculation of real estates, land has also been improved significantly, leading to the rise of housing prices.

### (4) Effects of interest rate on housing prices

According to the modern theory of finance, interest rate is the price of funds, which reflects the supply and demand of capital market and also adjusts the relation of capital's supply and demand. With the impact of price level, economic cycles and expectation, interest rate, as an outer factor, has an apparently effect on real estate economy. Whatever we take the point from the banks or the buyers and speculators, bank interest rates will restrain the results of demand for housing. Reduction of demand will ease the contradiction between supply and demand, and reduce the rate of housing prices.

### (5) Effects of exchange rate on housing price

In an open economy, the exchange rate has become increasingly important macroeconomic variables in economic life and the change of exchange rate affects fluctuations in the real estate market. As the degree of financial markets continues to improve, exchange rate and housing prices interact and influence worse than ever.

The anticipation of RMB appreciation and housing prices rising not only attract foreign investment into the real estate market arbitrage activities, but also further promote the rise of house prices; The performance of housing prices increasing the attractiveness of foreign capital inflows, will further enhance the inflow of foreign capital, which in turn will increase the upward pressure. The continual cycles of RMB appreciation - inflow of foreign capital - housing prices rising increase the pressure on RMB appreciation and limits.

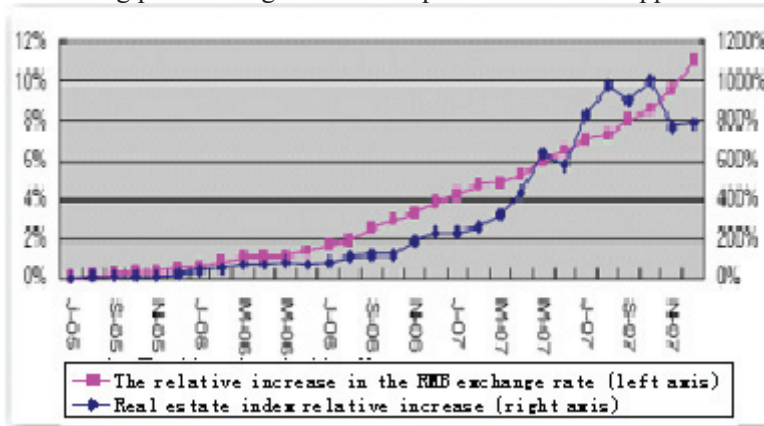


Fig.2-1 RMB exchange rate and real estate industry index

From Figure 2-1, we can see that the RMB exchange rate and real estate indices are increasing year by year from 2005 to 2007, especially in 2007, the RMB exchange rate and the real estate price index rose faster, and the real estate prices appeared greater fluctuating. When the exchange rate appreciation and house prices rise to a certain extent, the expected changes will lead to the outflow of foreign capital, and housing prices will

decline sharply because of the lack of funds to support. These external shocks easily lead to real estate bubble and bring about real estate market ups and downs, creating the abnormal price fluctuations, which is not conducive to long-term stability and development.

### 3、Analysis about the hazard of price fluctuations and price regulation

#### (1) The analysis about the hazard of price fluctuations

Firstly, housing prices rising rapidly easily lead to asset bubbles, and affect financial stability and economic healthy development. That's because the real estate and finance are inseparable. Many home buyers use the assets of a lifetime to purchase a house. Once they have a great loss in housing, this must affect the social stability.

Secondly, the prices exceed the capacity of ordinary citizens, affecting the fairness and stability.

Again, the price is too high causing an excessive burden on home buyers, impacting a country, city or region's competitiveness. This city or region can easily be marginalized.

Finally, the rapid rising of housing prices makes investment and speculative demand vigorous, and has a crowding-out effect on the funding needs of the real economy. When a certain industry in the national economy is a lucrative one, the money will flood to this area, and their competitiveness will be degraded.

#### (2) The analysis about the difficulties of price regulation

First, the development of China's urbanization has brought about the rigid requirements. Take Japan's real estates market for example, when the rate of urbanization is up to 80%, the rigid demand reduced and then the bubble burst. Now, China's urbanization rate is less than 50%, and there are around 15 million farmers move into the city, so housing rigid demand is vigorous, and it is very difficult to control.

Second, private capital investment is too narrow;

Third, the globalization of hot money flowing and RMB appreciation are expected to combine.

Fourth, the lack of the tax system in real estate holding part;

Fifth, the dependence of local governments on the land finance leads to the higher housing prices and higher land prices. The higher the land prices, the more money the local governments can use for urban infrastructure.

Sixth, China's economic development gap between regions is very large; housing prices in some coastal cities rise suddenly and sharply, keeping pace with the housing prices in some areas of the developed countries. However, the real estate in some inland cities has just started. In this case, it is very difficult for the government to regulate the real estate market of the whole country with "equal" approach and it is of little hope to get good results.

Therefore, controlling the real estate prices needs synergy between various departments, coordination of the central and local governments, and combination of the control policies

Local governments should be given appropriate policies and measures, including land, finance, and fiscal policy; the central government be given a reasonable model predictions.

We have gained some experiences and achievements of 30 years in the real estates market, which are hard won. At the same time, we also need to face some problems. Only in this way can we avoid falling at the same place twice.

### 4、Policy proposals to control housing prices in the future

According to the actual housing price fluctuations at the present time, housing price regulation should be focused on the short-term cyclical fluctuations. Currently, the key is local governments should introduce relevant support measures in detail and timely and strengthen central control policies at local place. At the same time, it should also pay attention to guiding the market psychology's expectation. What's the most fundamental is to change the people's view about homes and buildings staff, and guide consumers to rationally deal with housing and space requirements. Specifically we can start from the following aspects:

Firstly, try to increase the effective supply of land, and regulate local government's behaviours and protect the source of rising housing prices. Increasing land supply includes two aspects: One is to increase the supply of land market appropriately, under the range of the land protection policy, especially to increase the low-price commercial housing and affordable housing construction land supply; the other is to make good use of the secondary land market.

Secondly, try to improve the supply structure and increase the effective supply of common commercial housing, and increase the construction of affordable housing further. Do our best to increase land supply in low-cost, small and medium size public rental housing and try to improve land supply and service efficiency. Under the premise of guaranteeing quality, speed up the construction of common commercial housing supply structure to control real estate market. The focus should be laid on meeting the needs of local residents for low-cost housing and small and medium size apartment. Try to expand low-rent housing and affordable housing.

On the basis of controlling the high-priced real estate in residential construction, adjust the supply of land for real estate development and structural timely; make every effort to increase the ordinary commodity housing, affordable housing and low-cost housing construction scale.

Thirdly, try to strengthen the market supervision, crack down on excessive speculation in the real estate market, prohibit accumulation of real estate and housing hoard, and curb speculative demand for housing. To curb the excessive real estate prices rising, the first thing is to crack down on excessive speculation and speculation in the real estate market, and the real estate speculation should be heavily taxed. Crack down on real estate speculators through legislation. Besides, investigate responsibility for local officials who connive such behaviours; Consumer credit policy in commercial banks should be closely examined. Ensure that demand for loans from the housing, and resolutely put an end to speculation in housing credit. link the credit risk with responsibility, and the income levels with housing demand. The housing demand of the individuals will drop as long as we make critical review of the individual housing consumer credit.

Fourthly, guide all aspects of the rational expectations and form a correct idea of consumption and behaviour. On the one hand, we should try to make the real estate businessmen rationally realize the risk of over-inflated home prices on their own, real estate and the entire national economy. Try to transfer more power of increased profits to expand the enterprise scale and improve the housing qualities, optimize the structure and reduce operating costs. On the other hand, try to guide the consumers to rationally recognize the risk of "buy or not buy down", overcome the herd mentality and build the anticipation on the basis of understanding the real estate market and its changeable information. Meanwhile, the government should establish and improve the real estate market early warning monitoring system, strengthening statistics and publicity of data and information. Through dynamic monitoring of real estate and related industries, release information, correctly guide the direction of the real estate business development and investment, promote the consumption of the masses to form rational expectations, and reveal the government's determination to suppress the behaviour of real estate market and the efforts to regulate the market.

Fifthly, to carry out the land use rights bidding system strictly. Set up the legal status of urban planning through legislation. Protect the rationality of land use structure, and regulate the land market from the source to the land. Improve land bidding and auction system and make transaction of state-owned land use right open, fair and just. In the evaluation process, we should consider the price of the bidder and its planning programs, business intelligence performance, bank credit and so on to take the best bid according to their comprehensive assessment. Continue to improve the state-owned land use right transfer of detailed provisions, such as the late development of the land included in the contract schedule, etc., to prevent developers' hoarding land.

Sixthly, increase policy enforcement. The government should continue to implement macro-control policies and greater policy enforcement, especially to strengthen the management of real estate development and policy oversight, market consolidation efforts, legislative enforcement and implementation of land system efforts. Though there is no sharp rise in house price emerging in areas, yet local government and relevant departments should pay attention to the real estate market and stay wide-awake against the transfer of real estate speculation in the regional capital. In the principle of "maintain pressure, differential treatment", we should try to prevent the development of housing investment and price growth from rebounding, keep the rising housing prices under control as soon as possible.



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